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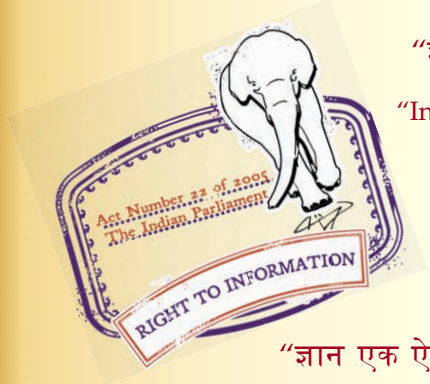



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"Knowledge is such a treasure which cannot be stolen"

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# इलैक्ट्रॉनिक उपस्कर के लिये विद्युत यांत्रिक संघटकों की मूल परीक्षण कार्यविधियां और मापन पद्धतियां

## भाग 9 केबल-सिरंज परीक्षण, विस्फोट जोखिम परीक्षण, रासायनिक प्रतिरोध परीक्षण, अग्नि जोखिम परीक्षण, रेडियो आकृति प्रतिरोध परीक्षण, संधारिता परीक्षण, शिल्डिंग और छानन परीक्षण और चुम्बकीय व्यतिकरण परीक्षण

*Indian Standard*

# BASIC TESTING PROCEDURES AND MEASURING METHODS FOR ELECTROMECHANICAL COMPONENTS FOR ELECTRONIC EQUIPMENT

## PART 9 CABLE-CLAMPING TESTS, EXPLOSION HAZARD TESTS, CHEMICAL RESISTANCE TESTS, FIRE HAZARD TESTS, R.F. RESISTANCE TESTS, CAPACITANCE TESTS, SHIELDING AND FILTERING TESTS AND MAGNETIC INTERFERENCE TESTS

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## FOREWORD

This Indian Standard ( Part 9 ) was adopted by the Bureau of Indian Standards, after the draft finalized by the electromechanical components for electronic equipment Sectional Committee had been approved by the Electronics and Telecommunication Division Council.

The object of this standard is to lay down uniform methods of tests for Cable-clamping, Explosion hazard, Chemical resistance, Fire hazard, r.f. resistance, Capacitance and Magnetic interference of Electromechanical components.

The standard is based, without any technical change on IEC Pub 512-9 ( 1977 ) 'Electromechanical components for electronic equipment; Basic testing procedures and measuring methods : Part 9 : Cable-clampir g, explosion hazard, chemical resistance, fire hazard, r.f. resistance, capacitance and magnetic interference of electromechanical components', issued by the International Electrotechnical Commission ( IEC ).

In reporting the result of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS 2 : 1960 'Rules for rounding off numerical values ( *revised* )'.

*Indian Standard*

# BASIC TESTING PROCEDURES AND MEASURING METHODS FOR ELECTROMECHANICAL COMPONENTS FOR ELECTRONIC EQUIPMENT

## PART 9 CABLE-CLAMPING TESTS, EXPLOSION HAZARD TESTS, CHEMICAL RESISTANCE TESTS, FIRE HAZARD TESTS, R.F. RESISTANCE TESTS, CAPACITANCE TESTS, SHIELDING AND FILTERING TESTS AND MAGNETIC INTERFERENCE TESTS

## 1 SCOPE

**1.1** This standard ( Part 9 ) covers test methods for measuring cable-clamping tests, explosion hazard tests, chemical resistance tests, fire hazard tests, r.f. resistance tests, capacitance tests, shielding and filtering tests and magnetic interference tests.

## 2 REFERENCES

**2.1** The Indian Standards listed below are necessary adjunts to this standard:

| *IS No.* | *Title* |
|---|---|
| 9000 ( Part 19/ Sec 1 ) : 1986 | Basic environmental testing procedures for electronic and electrical items : Part 19 Test U: Robustness of terminations and integral mounting devices, Section 1 Test Ua1: Tensile ( *first revision* ) |
| 12448 ( Part 2/ Sec 1 ) : 1988 | Basic testing procedures and measuring methods for electromechanical component for electronic equipment: Part 2 General examination, electrical continuity and contact resistance tests, insulation tests and voltage stress tests, Section 1 General requirements |

## 3 CABLE-CLAMPING TESTS

### 3.0 Test 17a: Cable-Clamp Robustness

### 3.1 General

The object of this test is to detail a standard test method to assess the ability of a cable-clamping device to withstand mechanical stresses likely to be encountered during normal usage.

### 3.2 Preparation of the Specimen

The specimen shall consist of the specified cable/wire bundle fitted in the normal manner to its associated component or sub-assembly by means of the cable-clamping device.

The specimen shall be prepared and mounted in accordance with the detail specification.

### 3.3 Test Method

With the specimen rigidly mounted in such an attitude that the cable/wire bundle is in a horizontal position, a bending moment shall be produced by applying a specified vertical force to the cable/wire bundle at a specified distance from the cable-clamp.

This force shall be increased at a rate not to exceed 20 N/s until the specified value is reached. It shall be maintained at that value for 1 min.

The force shall then be removed and the cable returned to the horizontal attitude. The specimen is then rotated at 90° increments around the horizontal axis. At each 90° increment, the specified bending moment is reapplied.

This test shall be repeated the number of times stated in the detail specification.

### 3.4 Final Measurements

The specimen shall be examined visually in accordance with Test 1a at the junction of the cable/wire bundle and the clamping device and at the junction of the clamping device and the component or sub-assembly.

### 3.5 Requirements

There shall be no damage to the cable/wire bundle, or to the specimen.

The cable/wire bundle shall not be displaced permanently by more than the amount specified in the detail specification.

### 3.6 Details to be Specified

When this test is required by the detail specification, the following details shall be specified:

a) Preparation of the specimen and type of cable/wire bundle to be used and whether contacts have to be connected.

b) Mounting of the specimen;
c) Force and torque to be applied and point of application;
d) Number of applications;
e) Requirements for final measurements, and
f) Any deviation from the standard test method.

## 4 TEST 17b: CABLE-CLAMP RESISTANCE TO CABLE ROTATION

### 4.0 General

The object of this test is to detail a standard method to assess the ability of a cable-clamping device to allow rotary move of the cable/wire bundle without damage to the external surface the cable/wire bundle the cable-clamping device, the component or the sub-system.

### 4.1 Preparation of the Specimen

The specimen shall consist of the specified cable/wire bundle fitted in the normal manner to its asscciated component or sub-system by means of the cable-clamping device.

The specimen shall consist of the specified cable/wire bundle fitted in the normal manner to its associated component or sub-system by means of the cable-clamping device.

The specimen shall be prepared and mounted in accordance with the details specification.

### 4.2 Test Method

The free end of the cable/wire bundle shall be deflected at an angle of 45° to 50° to the axis of the entry to the specimen and rotated 360°. The number and the maximum speed of the rotations shall be stated in the detail specification.

During the test, the cable/wire bundle shall be subjected to a torque or a pull not greater than the minimum value necessary to maintain the proper alignment of the cable/wire bundle.

### 4.3 Final Measurement

The specimen shall be examined visually in accordance with Test at the junction of the cable/wire bundle and the clamping device and at the junction of the clamping device and the component or sub-assembly.

### 4.4 Requirements

There shall no damage to the cable-wire bundle external surface nor to the specimen.

### 4.5 Details to be Specified

When this test is required by the detail specification, the following details shall be specified:

a) Preparation of the specimen and type of cable/wire bundle to be used;
b) Mounting of the specimen;
c) Number and speed of rotations;
d) Requirements for final measurements; and
e) Any deviation from the standard test method.

## 5 TEST 17c: CABLE-CLAMP RESISTANCE TO CABLE PULL ( TENSILE )

### 5.0 General

The object of this test is to detail a standard test method to assess the ability of a cable-clamping device to prevent longitudinal movement of the cable/wire bundle.

### 5.1 Preparation of the Specimen

The specimen shall consist of the specified cable/wire bundle fitted in the normal manner to its associated component or sub-assembly by means of the cable-clamping device.

The specimen shall be prepared and mounted in accordance with the detail specification. The specimen shall not be wired.

### 5.2 Test Method

With the specimen rigidly mounted in such an attitude that the cable/wire bundle is in a vertical position, a specified tensile force shall be applied axially to the free end of the cable/wire bundle. This force shall be increased gradually at a rate not exceeding 20 N/s until the specified value is reached. The maximum value shall be maintained for 1 min.

### 5.3 Final Measurements

The specimen shall be examined visually according to Test at the junction of the cable/wire bundle and the clamping device and its associated component or sub-assembly.

### 5.4 Requirements

There shall be no damage such as would impair operation and the cable/wire bundle shall be displaced by not more than the amount specified in the detail specification.

### 5.5 Details to be Specified

When this test is required by the detail specification, the following details shall be specified:

a) Preparation of the specimen and type of cable/wire bundle to be used;
b) Mounting of the specimen;
c) Force to be applied:
d) Requirements for final measurements; and
e) Any deviation from the standard test method.

## 6 TEST 17d: CABLE-CLAMP RESISTANCE TO CABLE TORSION

### 6.0 General

The object of this test is to detail a standard test method to assess the ability of a cable-clamping device to prevent the rotation of the cable/wire bundle around its axis.

### 6.1 Preparation of the Specimen

The specimen shall consist of the specified cable/wire bundle fitted in the normal manner to its associated component or sub-assembly by means of the cable-clamping device.

The specimen shall be prepared and mounted in accordance with the detail specification.

### 6.2 Test Method

With the specimen rigidly mounted, a torque shall be applied to the cable/wire bundle at a specified distance from the cable-clamping device. This torque shall be increased gradually at a rate not exceeding 0·5 Nm/s until the specified value is reached. The maximum value shall be maintained for 1 min.

### 6.3 Final Measurements

The specimen shall be examined visually according to Test at the junction of the cable/wire bundle and the clamping device and at the junction of the clamping device and the component or sub-assembly.

### 6.4 Requirements

The cable/wire bundle shall not have slipped or rotated within the clamping device nor shall the clamp have moved in relation to the component or sub-assembly body beyond the limits specified in the detail specification.

### 6.5 Details to be Specified

When this test is required by the detail specification, the following details shall be specified:

a) Preparation of the specimen and type of cable/wire bundle to be used;
b) Mounting of the specimen;
c) Details of the test;
d) Value of the torque, direction and point of application;
e) Requirements for final measurements; and
f) Any deviation from the standard test method.

## 7 EXPLOSION HAZARD TEST

### 7.0 Test 18a: Explosion Hazard

Under consideration.

## 8 CHEMICAL RESISTANCE TESTS

### 8.0 Test 19a: Resistance to Fluids

Under consideration.

### 8.1 Test 19b: Resistance to Ozone

Under consideration

## 9 FIRE HAZARD TESTS

### 9.0 Test 20a: Flammability

Under consideration.

## 10 TEST 20b: FIREPROOFNESS

Under consideration.

## 11 R.F. RESISTANCE TESTS

### 11.0 Test 21a: R.F. Shunt Resistance

### 11.1 General

The object of this test is to detail a standard test method to determine the value of r.f. shunt resistance which degrades the Q-factor of an L/C circuit when a component is connected in parallel. This value is expressed in terms of a parallel clamping resistance.

### 11.2 Preparation of the Specimen

The specimen shall be prepared and mounted according to the detail specification.

### 11.3 Test Method

The r.f. shunt resistance shall be measured with suitable measuring equipment. The measuring point shall be specified in the detail specification. The measuring error shall not exceed $\pm 10\%$.

The test frequency shall be specified in the detail specification. The preferred frequencies are:

1 MHz, 10 MHz, 30 MHz and 100 MHz.

### 11.4 Requirements

The value of r.f. shunt resistance shall be not less than the value specified in the detail specification.

### 11.5 Details to be Specified

When this test is required by the detail specification, the following details shall be specified:

a) Preparation and mounting of the specimen;
b) Measuring points;
c) Measuring frequency;
d) Minimum value of r.f. shunt resistance; and
e) Any deviation from the standard test method.

## 12 CAPACITANCE TESTS

### 12.0 Test 22a: Capacitance

### 12.1 General

The object of this test is to detail a standard test method to determine the capacitance between conductive elements of electromechanical components.

### 12.2 Preparation of the Specimen

The specimen shall be prepared and mounted according to the detail specification.

### 12.3 Test Method

Any one of the following contact combination may be measured:

a) between one contact and the following parts, all connected to earth at a common point;
   — all other contacts,
   — all metal parts,
   — all mounting plate;

b) between any two adjacent contacts, the following parts all being connected to earth at a common point;
   — all other contacts,
   — all metal parts,
   — all mounting plates;

c) any other measuring point or operating condition as specified by the detail specification.

The capacitance shall be measured at a frequency as specified by the detail specification, using a suitable test set, for example, a capacitance bridge which will ensure an accuracy of $\pm 5\%$.

The preferred measuring frequencies are:

1 kHz $\pm$ 200Hz,

1 MHz $\pm$ 200 kHz

### 12.4 Requirements

The value of capacitance shall not exceed t he values specified by the detail specification.

### 12.5 Details to be Specified

When the test is required by the detail specification, the following details shall be specified:

a) Preparation of the specimen;
b) Mounting of the specimen;
c) Contact combinations to be measured;
d) Value of the measuring frequency;
e) The maximum permitted value(s) of the capacitance(s); and
f) Any deviation from the standard test method.

## 13 SHIELDING AND FILTERING TESTS

### 13.0 Test 23a: Coupling Resistance

Under consideration.

## 14 TEST 23b: FILTERING

Under consideration.

## 15 TEST 23c: CROSSTALK

Under consideration.

## 16 MAGNETIC INTERFERENCE TESTS

### 16.0 Test 24a: Test of Residual Magnetism

Under consideration.

## 17 TEST 24b: MAGNETIC INFLUENCE OF A COMPONENT ON A COMPASS

Under consideration.

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